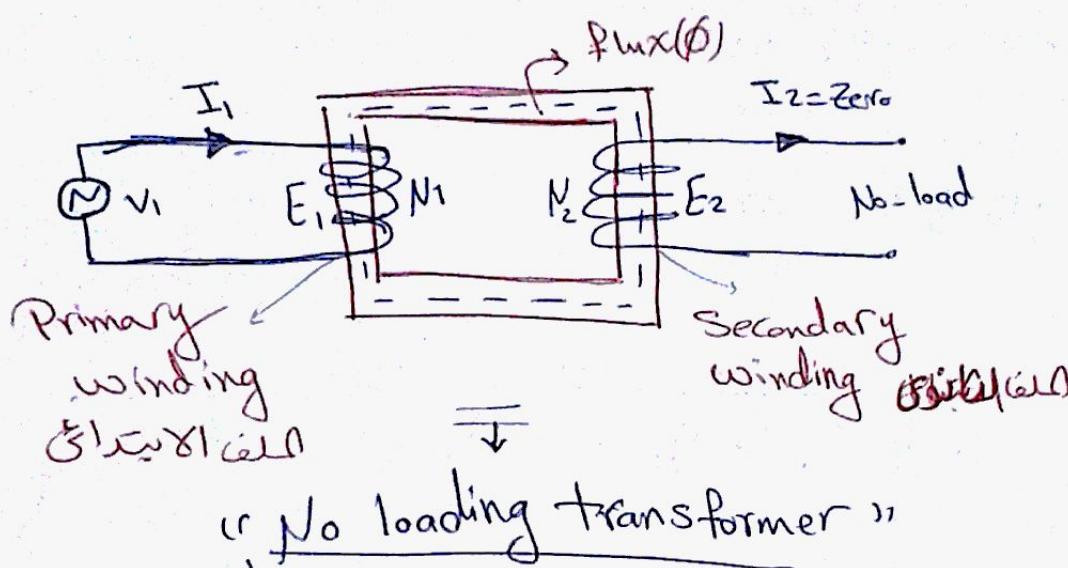


## Lec 7: Performance c/s of efficiency (2%) of 1-φ transformer

### Outline:

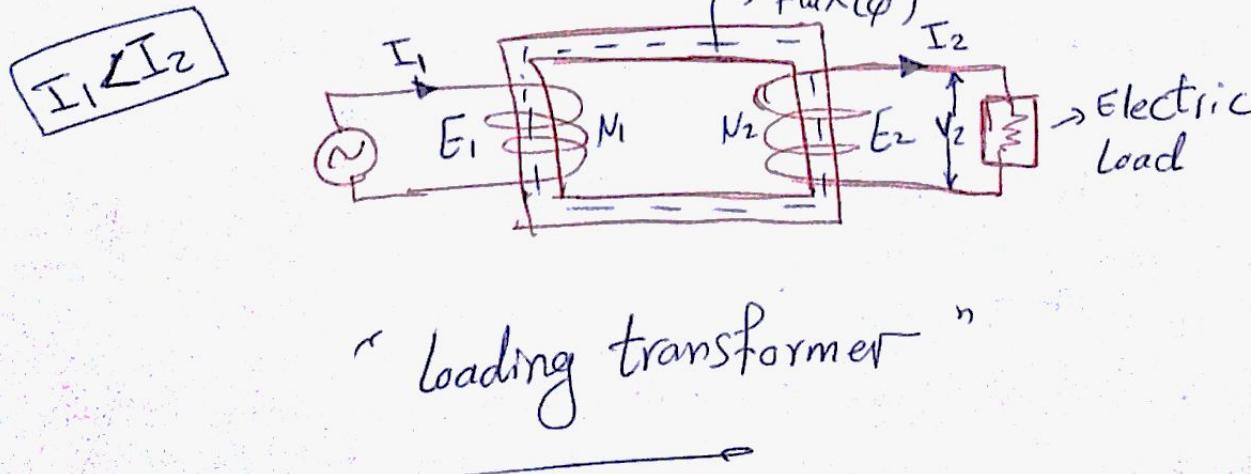
- ① Transformer under no loading
- ② Transformer under loading
- ③ Equivalent circuit of 1-φ transformer
- ④ Losses & efficiency of 1-φ transformer

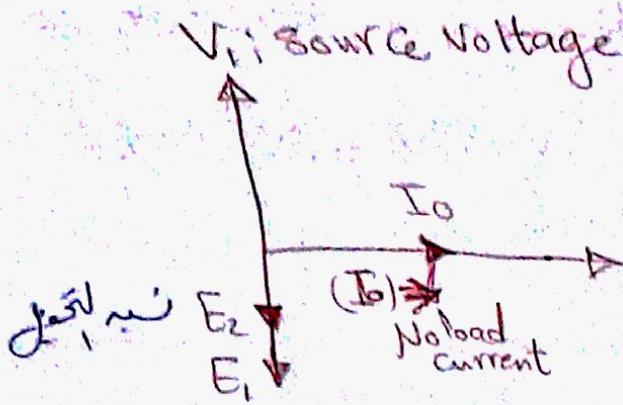


$V_1$ : Alternating Voltage Source (M)

$E_1$  &  $E_2$ : induced voltage on Primary winding & Secondary winding

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$E_2 = V_2$  = induced voltage in secondary winding

$E_1 = V_1$  = induced voltage in Primary winding

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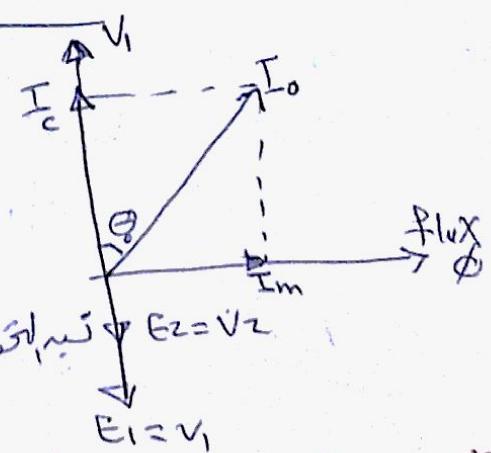
$$\text{turns ratio} = \frac{N_2}{N_1} = \frac{1}{2}$$

### losses in transformers

- 1 Electrical losses
- 2 Magnetic losses
- \* No mechanical losses

\*\*\* Ideal transformer: has no losses

\* Iron losses =  $V_1 I_0 \cos \theta_0$  [Watt]



\*  $I_c = I_0 \cos \theta_0$  [Amp]

\*  $I_m = I_0 \sin \theta_0$  [Amp]

\*  $I_0 = \sqrt{I_m^2 + I_c^2}$  [Amp]

$I_c$ : Core loss current  
سُرૂલીની

$I_m$ : magnetizing current

Produce mutual flux in magnetic core

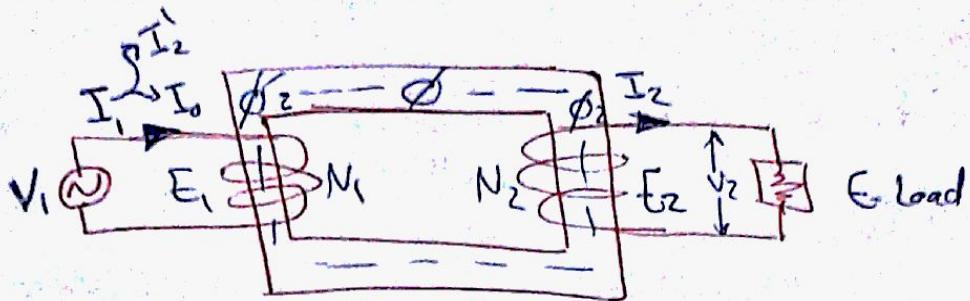
the hysteresis & eddy current

losses

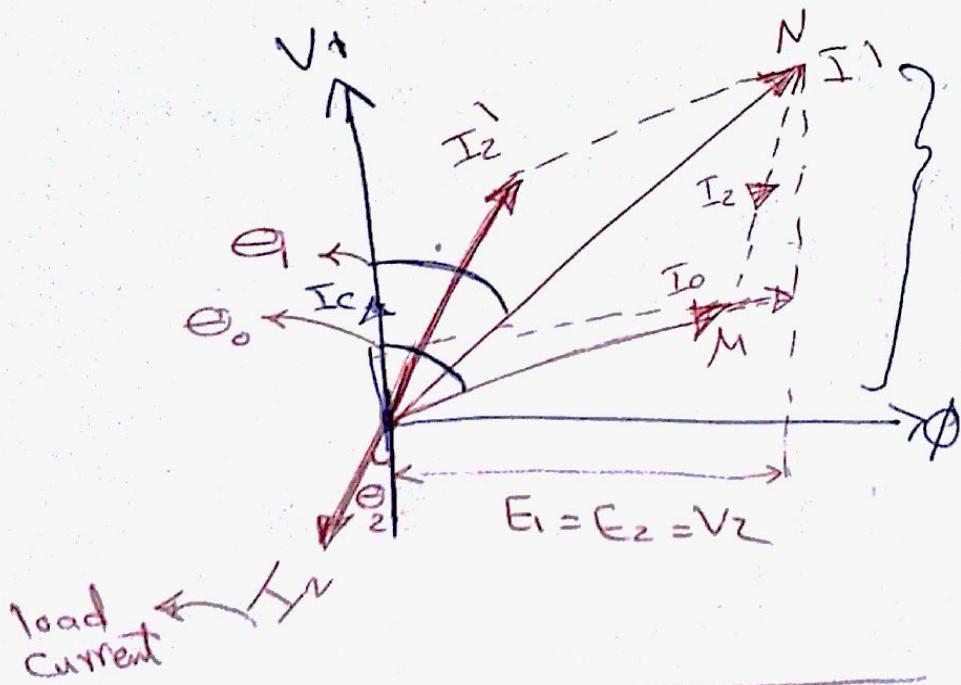
### Practical transformer

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## Transformer under loading Condition



若  $\phi_1, \phi_2$  为  $\phi$  的原像，则  $\phi_1, \phi_2$  为  $\phi$  的原像



$$I_1 \cos \theta_1 = I_0 \cos \theta_0 + I_2 \cos \theta_2$$

$$I_1 \sin \theta_1 = I_0 \sin \theta_0 + I_2 \sin \theta_2$$